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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/619,172

07/11/2003

John McCollum

ACT-367

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12/30/2004

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EXAMINER

LANDAU, MATTHEW C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/619,172	<b>Applicant(s)</b> MCCOLLUM ET AL.	
	<b>Examiner</b> Matthew Landau	<b>Art Unit</b> 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 5, 6 and 9-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☒ Claim(s) 7 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/27/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election without traverse of Group I and Species I in the reply filed on October 12, 2004 is acknowledged.

Claims 5, 6, and 9-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and species, there being no allowable generic or linking claim.

### ***Drawings***

Figures 1-5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claims 3 and 7 are objected to because of the following informalities:

Regarding claim 3, the limitation "said second channels" lacks antecedent basis in the claim. There is only second channel defined by the claim. Therefore, the limitation should be changed to read, "said second channel[s]". Claim 7 has the same problem.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the limitation “doped so as to reduce capacitive coupling” renders the claim indefinite. Since the claim does not define the meets and bounds of the relative term “reduce”, it is unclear how this limitation structurally defines the claimed invention. In other words, since the claim does not establish any basis for comparison, there is no way to determine what the capacitive coupling must be in order to be considered reduced (i.e., reduced compared to what?). For the purposes of this Office Action, it is considered that any region having a doping level will have a reduced capacitive coupling when compared to an arbitrarily selected region with a higher doping level. Claim 2 has a similar problem.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by London (US Pat. 6,114,731).

Regarding claims 1 and 2, as best the examiner can ascertain the claimed invention, Figure 3A of London discloses a transistor formed on a semiconductor substrate 300 of a first conductivity type (p-type) and comprising: a well 206/306 formed in said substrate and doped with said first conductivity type to an impurity level higher than that of said substrate (col. 6, lines 10-13 and lines 40-44); a drain region 212b doped to a second conductivity type (n-type) opposite to said first conductivity type disposed in said well; a pair of opposed source regions 212a doped to said second conductivity type disposed in said well and separated from opposing outer edges of said drain region by channel regions, said pair of opposed source regions electrically coupled together; a pair of gates 232/332 disposed above and insulated from said channel regions, said gates electrically coupled together; and a region of said well disposed below said drain region (portion of substrate between regions 206 and 306) doped so as to reduce capacitive coupling between said drain region and said well. Note that the product disclosed in Figure 3A of London is essentially the same as the product disclosed in Figure 6 of the instant application, which discloses p-well regions 320 separated by region 322. As disclosed in the specification, region 322 is doped to same concentration as the substrate (page 10, lines 1 and 2). Therefore, in the final product, region 322 is equivalent to an extension of the substrate. Since this is a device claim, the manner in which the device is made does not patentably distinguish the claimed invention. Therefore, regions 206 and 306 of London can be considered a single well

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with a doped region (portion of the substrate) in the well. This interpretation is consistent with that of Applicant's specification.

Claims 1 and 2 rejected under 35 U.S.C. 102(b) as being anticipated by Kumagai (US Pat. 6,329,693).

Regarding claims 1 and 2, as best the examiner can ascertain the claimed invention, Figure 1 of Kumagai discloses a transistor formed on a semiconductor substrate 10 of a first conductivity type (p-type) and comprising: a well 18 formed in said substrate and doped with said first conductivity type to an impurity level higher than that of said substrate; a drain region 36 doped to a second conductivity type (n-type) opposite to said first conductivity type disposed in said well; a pair of opposed source regions 34/37 doped to said second conductivity type disposed in said well and separated from opposing outer edges of said drain region by channel regions, said pair of opposed source regions electrically coupled together; a pair of gates 32/35 disposed above and insulated from said channel regions, said gates electrically coupled together; and a region of said well disposed below said drain region doped so as to reduce capacitive coupling between said drain region and said well.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over London in view of Rhee (US Pat. 6,395,941).

Regarding claim 3, Figure 3A of London discloses a p-well 206/306 disposed in the p-type substrate 300, said p-well doped to a higher concentration than said substrate (col. 6, lines 10-13 and lines 40-44) and having a substrate-doped portion (portion of substrate between 206 and 306) therein doped to about the same concentration as said substrate, said substrate-doped portion extending vertically from an upper surface of said p-well to said substrate; an N<sup>+</sup> drain region 212b disposed in said substrate-doped portion of said p-well, a periphery of said N<sup>+</sup> drain region extending laterally into said p-well beyond an outer boundary of said substrate-doped portion of said p-well, a pair of N<sup>+</sup> source regions 212a spaced apart from opposite edges of said N<sup>+</sup> drain region at a distance sufficient to form first and second channels, each of said source regions electrically coupled together; a first gate 232 disposed above and insulated from said first channel; and a second gate 332 disposed above and insulated from said second channel and electrically coupled to said first gate. Note that the product disclosed in Figure 3A of London is essentially the same as the product disclosed in Figure 6 of the instant application, which discloses p-well regions 320 separated by region 322. As disclosed in the specification, region 322 is doped to same concentration as the substrate (page 10, lines 1 and 2). Therefore, in the final product, region 322 is equivalent to an extension of the substrate. Since this is a device claim, the manner in which the device is made does not patentably distinguish the claimed invention. Therefore, regions 206 and 306 of London can be considered a single well with a doped region (portion of the substrate) in the well. This interpretation is consistent with that of

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Applicant's specification. The difference between London and the claimed invention is the source and drain regions surrounded by lightly doped N regions. Figure 5 of Rhee discloses source and drain regions, wherein each source/drain region consists of a heavily doped portion surrounding by a lightly doped portion. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of London by using the lightly doped regions of Rhee. The ordinary artisan would have been motivated to modify London in the manner described above for the purpose of reducing the electric field in the vicinity of the channel region, thereby reducing hot electron effects, which is well known in the art.

Regarding claim 4, Figure 3A of London discloses said periphery of said N<sup>+</sup> drain region extends laterally into said p-well beyond said outer boundary of said substrate-doped portion of said p-well a distance about equal to that of said first and second channels.

***Allowable Subject Matter***

Claims 7 and 8 would be allowable if rewritten or amended to overcome the claim objections set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including a second transistor including an n-well disposed in said p-type substrate, a portion of said n-well more lightly doped than the remainder of said n-well; a P<sup>+</sup> drain region disposed in said lightly-doped region of said n-well, a periphery of said P<sup>+</sup> drain



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region extending beyond an outer boundary of said lightly-doped region of said n-well, a pair of P+ source regions spaced apart from opposite edges of said P+ drain region, wherein said drain of said first transistor and said drain of said second transistor are coupled to said input output pad, said source regions of said first transistor are coupled to ground, said source regions of said second transistor are coupled to a supply potential, and said gate regions of said first transistor and said second transistor are coupled to an output of said internal circuit.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



**BRADLEY BAUMEISTER  
PRIMARY EXAMINER**

Matthew C. Landau

Examiner

December 22, 2004